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Substance abuse among the chronically mentally ill in a Department of Human Services Case Management System

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INTRODUCTION

In the United States, mental illness and substance abuse have long been considered detriments to individuals, families, and society. In recent decades, however, there has been increased recognition of the coexistence of mental illness and substance use disorders. This coexistence has been termed dual disorder, dual diagnosis, and substance use disorder comorbidity (Drake & Mueser, 2000). As recent research has determined, the comorbidity of these disorders is far from rare and poses major challenges to clinicians, patients, and families.

Substance abuse is the most common comorbidity for individuals with mental disorders (Mueser, Bellack, & Blanchard, 1992). Dual diagnosis has been linked to increased severity of psychiatric symptoms, hospitalizations, lack of stable housing and homelessness, increased risk of suicide, and poor psychosocial adjustment (Bartels, Drake, & McHugo, 1992; Drake & Wallach, 1989). Comorbid substance use disorders also impose a significant economic cost upon the individuals and families they affect (Clark, 1994).

Although substance abuse and mental illness are hardly new problems in our society, several historical features may have contributed to the growth of their coexistence rather recently. In the second half of the 20th century, public policy in the United States began to focus upon deinstitutionalization of mental patients. The main focus in psychiatry at that time was to help mentally ill persons adjust to community living (Drake & Wallach, 2000). Slowly, professionals in the field of mental health and social work began to notice a problem of mentally ill persons who now lived in the community rather than in mental institutions. It seemed that street drugs were accessible to the growing population of non-institutionalized mentally ill persons. In the early 1980's, a few articles were published describing younger,

severely mentally ill persons encountering a culture filled with drugs and alcohol (e.g., Bachrach, 1982).

By the late 1980's, clinicians and health agencies were forced to recognize this population, and the coexistence of mental illness and substance abuse was acknowledged for the first time (Drake & Wallach, 2000). Individuals with both problems were called substance-abusing mentally ill or mentally ill substance abusers. Assessment and treatment of these individuals became an issue, and researchers (e.g., Lehman, Myers, & Corty, 1989) began to pay attention to the coexistence of mental disorders and substance abuse. The term dual diagnosis, despite its obvious ambiguity, became standard usage in the mental health field.

Mental disorders and substance use disorders occur together much more frequently than chance would predict. The National Comorbidity Survey (NCS), conducted from September 1990 to February 1992, provides the most comprehensive prevalence estimates of mental illness and substance abuse. The survey was based on structured interviews of 8,098 non-institutionalized U.S. citizens, ages 15 to 54 years. The response rate was 83%, and there was a financial incentive for participation (Kessler, McGonagle, Zhao, & Nelson, 1994).

NCS data suggests that nearly 30% of the population have exhibited a type of substance abuse/dependence or any mental health disorder (including affective, anxiety, non-affective psychosis, and anti-social personality disorder) within the previous year (Kessler et al., 1994). Of these individuals, about 18% have suffered from only a mental illness, and 7% suffered from only a substance use disorder (including alcoholism). A certain portion of the population experienced both mental disorder and substance abuse disorder within the previous year. NCS data reports that this number is 8 million persons in the United States

(nearly 5%; Kessler et al., 1994). According to the NCS, about 14% of the population, age 15 to 54, has had or will have the coexistence of mental illness and substance abuse in their lifetime.

Reiger and colleagues (1990) report that the rate of lifetime substance use disorder in the general population is about 17%. It has been suggested that the rate among persons with mental illness is much higher. For instance, the lifetime rate of substance abuse among individuals with schizophrenia is 48%, and the rate for persons with bipolar disorder exceeds 50% (Reiger et al., 1990). Reiger and colleagues (1990) indicate that half of persons with severe mental illness will also have a substance use disorder at some point during their lives. Rates of recent substance abuse among individuals with mental illness also reflect the seriousness of this issue. Between 25 and 35% of individuals with severe mental illness have exhibited substance use disorder in the past six months (Reiger et al., 1990).

Polysubstance abuse rates are also important to note. Cuffel, Heithoff, and Lawson (1993) determined that 14% of persons with schizophrenia have a problem with more than one substance. Unfortunately, the issue of polysubstance abuse is typically neglected by researchers intending to examine the prevalence of dual diagnosis.

LITERATURE REVIEW

Models of Dual Diagnosis

The mental health field has typically viewed substance-related problems from a medical perspective. However, substance abuse and mental illness can also be considered from other perspectives. Three perspectives of dual diagnosis (medical, moralistic, and psychosocial) will be discussed in this section. Each model will be discussed in relation to both substance abuse and mental illness.

Medical Perspective

Substance Abuse

The medical perspective views substance abuse as a chronic disease. Medical theorists posit that alcohol and drug abuse are illnesses caused by malfunctioning parts of an organism rather than social factors or personal weaknesses. This perspective focuses on biology and emphasizes brain anatomy, brain, chemistry, and genetics (Schwartz, 1999).

Proponents of the medical model study genetic predisposition and biochemical factors as related to substance use disorders. The genetic predisposition theory has been supported by research on human twins (Goodwin, 1976, 1984), persons adopted shortly after birth (Cadoret, Yates, Troughton, Woodworth, & Stewart, 1995; Goldstein, 1994), and animal breeding experiments (Li, 2000). Proponents of biochemical theories have evidence that drugs alter the activity of certain neurotransmitters in the brain (Goldstein, 1994). Continuing use of a drug decreases the brain's production of neurotransmitters, leaving a person in need of more of that drug. If drug use if ceased, the supply of neurotransmitters remains low for a time, which creates withdrawal.

There are obvious advantages to the medical perspective. For instance, it allows practitioners to help substance abusers in ways that do not blame the patient. In addition, biological treatments (e.g., medications) help people cease substance use and withdraw from substances. However, the medical perspective has been criticized for its lack of attention to important psychosocial factors, such as poverty and deviant peers (Drake & Wallach, 2000).

Mental Illness

Proponents of the medical perspective argue that a malfunctioning brain causes abnormal functioning. The medical model discusses brain anatomy, brain chemistry, and genetics as factors in psychiatric illnesses. This paradigm is supported by much research. For instance, researchers have discovered that disorders can be linked to problems in message transmission from neuron to neuron and that inheritance plays a role in mental illnesses, such as schizophrenia and mood disorders (Faraone, Tsuang, & Tsuang, 1999).

Biological treatments, such as drug therapy, are used frequently to treat persons with mental illness and often bring relief after other therapies have fallen short. In this sense, the contribution of the medical perspective to the field of mental illness is tremendous. However, it has been argued that medical proponents expect to explain all behavior in biological terms, and that this expectation limits understanding of mental illness (Anderson & Scott, 1999; Miller, 1999). In addition, this model responds to a person's mental problems with only biological treatments, which often produce undesired side effects, such as restlessness, severe shaking, and muscle contractions.

Moralistic Perspective

Substance Abuse

In our culture, it is not unusual to hear talk about "getting tough" on drugs. The moralistic perspective underlies the current effort to emphasize control and punishment regarding drugs (Drake & Wallach, 2000). In recent years, the public has been increasingly concerned about violent behavior, vagrancy, and misuse of welfare resources by persons with substance abuse problems. Drake and Wallach (2000) argue that in reality chemically-dependent persons may be victims of misguided public policy.

Disadvantages of the moralistic model include the public's lack of compassion for persons with substance use problems. On the other hand, this model does allow persons to take responsibility for their actions, instead of shifting the blame to brain chemistry or genetics. However, this responsibility often comes in the form of criminal charges and societal stigma. This view has far-reaching implications for public policy. For instance, should the government spend money to treat substance abusers so they may avoid incarceration?

Mental Illness

The prevalence of the moralistic perspective on mental illness has declined as our society now views abnormal behavior as more medically-based rather than religiously-based (e.g., possession by the Devil). However, it is still common that persons with mental illness are criminalized and incarcerated. Drake and Wallach (2000) argue that individuals with psychiatric disorders are actually more likely to be victims than perpetrators in our culture. Deinstitutionalization has pushed mentally ill persons into poor living situations where gangs and drugs are commonplace. These persons are often victims of other residents and become

caught up in the criminal justice system, which often results in jail and prison terms for mentally ill persons. A moralistic view toward the mentally ill seems unlikely to help their situation unless programs are put into place so that the mentally ill can realistically take responsibility for their circumstances.

Psychosocial Perspective

Substance Abuse

Psychosocial theorists propose that people are most likely to develop substance use disorders when the conditions in which they live are adverse. This has been supported by research that suggests areas with higher unemployment rates also have higher alcoholism rates (Linsky, Strauss, & Colby, 1985). It has also been suggested that substance abuse is more likely to appear in families and environments where substance use is valued or accepted. For instance, alcohol abuse is more likely among teenagers whose parents and peers drink (Shucksmith, Glendinning, & Hendry, 1997).

This model lends itself to self-help programs such as Alcoholics Anonymous. Community prevention programs also take a psychosocial approach. The Just Say No program is an example of a prevention program that focuses on the individual, peer group, school, and entire community. Prevention programs may also be offered in activity centers, places of employment, other community settings, or through media outlets (Guild & Lowe, 1998; Saunders & Lee, 2000).

Mental Illness

This view assumes that psychiatric diseases should be understood in terms of social and cultural forces. In order to explain a person's abnormal behavior, his or her environment should be examined. What are the norms of the society in which the person lives? What type

of family structure does the person participate in? How do other people view or react to the person? Researchers have suggested that a person's environmental conditions create stress and increase the probability of abnormal behavior (Kleinman & Cohen, 1997).

This model provides an alternative to medical and moralistic views by suggesting that change should be at the public policy level (Drake & Wallach, 2000). In other words, if the environmental conditions that contribute to mental illness can be improved, rates of abnormal functioning will decrease. Rather than hospitalizing, medicating, or incarcerating the mentally ill, perhaps society should examine ways to improve their housing situations, provide more educational and vocational opportunities, and improve their financial situations. Other psychosocial approaches to mental illness include group therapy, self-help groups, and family therapy.

Although the psychosocial model contributes to understanding of mental illness, it falls short in predicting mental illness (Reynolds, 1998). In other words, why do some individuals in adverse conditions develop psychiatric problems, while others do not? Because of this limitation and other shortcomings, most clinicians would suggest that the psychosocial approach works best when operating with the medical model instead of competing against it.

Classification Model

Accurate diagnosis for persons with mental illness and substance use disorders is a necessary step in treatment. It is important that clinicians distinguish between psychiatric disorders and psychiatric symptoms caused by substances. The diagnosis process is complicated by the several possible relationships between psychiatric disorders and substance use disorders. A classification model has been developed to describe the primary

relationships between substance abuse and mental illness (Lehman et al., 1989). All of the following possibilities should be considered in assessment:

- Substance use disorders can cause the appearance of psychiatric symptoms and mimic psychiatric symptoms.
- Substance use disorders can trigger the development, cause the reemergence, and worsen the severity of mental disorders.
- Substance use disorders can mask symptoms of psychiatric disorders.
- Withdrawal from substances can cause psychiatric symptoms.
- Substance use disorders and mental disorders can coexist independently.
- Mental illness can mimic behaviors commonly linked with substance use disorders.

Typology

Similarly, a dual diagnosis typology has also been established in the literature (Zimberg, 1999). Three types of dual diagnoses are clearly defined. Type I is described primarily as a mental disorder with alcohol and/or drug abuse only when mental symptoms are present. Type II is defined as a primary substance use disorder with substance-induced psychiatric symptoms, and type III is described as independent psychiatric and substance use disorders of long duration that are either existing at different times or occurring at the same time. This typology was found to be reliable and valid when used with patients in psychiatric and substance abuse outpatient programs and with state hospital inpatient dual disorder patients. A study of 130 low-income outpatient individuals suggested that two-thirds fit type III criteria (Hein, Zimberg, Weisman, First, & Ackerman, 1997).

Research Findings

Research suggests that in several ways persons with a dual diagnosis are similar to those persons with only a substance use disorder. Like those persons without mental illness, individuals with a dual disorder use alcohol and drugs because they are bored, lonely, unable to sleep, and afraid of social situations (Mueser, Drake, & Wallach, 1998). This is contradictory to the unsupported speculative theory that suggests that the mentally ill usually use substances to self-medicate their psychiatric symptoms (Drake & Wallach, 2000).

Those persons with substance use disorders in the general population tend to abuse the same substances as persons with dual disorder. Alcohol, followed by marijuana and cocaine, is the most common substance abused by both groups (Barry et al., 1995; Mueser et al., 1992). In addition, researchers (Drake, Mueser, Clark, & Wallach, 1996) report that substance use disorder manifests itself as a relapsing, chronic disease for those persons with serious mental illness as well as for those individuals in the general population.

Individuals with severe mental illness tend to be more likely than the general population to encounter drugs and alcohol in their neighborhoods (Drake, Brunette, & Mueser, 1998). Because mental illness is correlated with lack of education and lack of job skills, persons with mental illness may be more likely to reside in low-income areas. Therefore, they experience a more frequent exposure to psychoactive substances because these low-income areas may be drug-infested.

It seems that persons with severe mental illness, in contrast to the general population, are unable to safely use alcohol and drugs moderately without negative results (Drake & Wallach, 1993). Small amounts of substances may decrease the psychiatric stability and impair the psychosocial adjustment of persons with mental illness, whereas small amounts of

substances may affect those individuals without mental illness very little. In other words, persons in the general population may "get away" with substance abuse to a greater degree than individuals with mental disorders.

Persons with both psychiatric illness and substance use disorder have been shown to be at higher risk for HIV infection and possibly other transmissible diseases than their counterparts with substance use disorders alone (King, Kidorf, Stoller, & Brooner, 2000). This is most likely due to the frequency of intravenous needle sharing, increased alcohol use, and lack of condom use during sexual intercourse.

Substance use disorder comorbidity is more likely in those mentally ill individuals who are male, younger, single, and less educated (Cuffel, 1996; Mueser, Bennett, & Kushner, 1995). NCS data indicates that persons age 15 to 24 are more likely than other persons to fit dual diagnosis criteria (Kessler et al., 1994). Other predictors of dual diagnosis are family history of substance problems (Noordsy, Drake, Biesanz, & McHugo, 1994) and history of conduct disorder (Mueser et al., 1999). Patients with substance use disorder and mental illness, as compared to patients with only mental illness, also have less insight into their psychiatric disorder, which may decrease chances of recovery (Goldberg, Green-Paden, Lehman, & Gold, 2001), and they are less satisfied with their treatment in general (Primm, Gomez, Tzolva-Iontchev, Perry, & Crum, 2000).

Although some research has indicated that persons with certain mental illnesses may be more likely to be diagnosed with dual disorder than persons with schizophrenia (Dixon et al., 1993), not all research supports this finding (Primm et al., 2000). In addition, those persons with mental illness who are homeless or in jail tend to be more likely to have a substance abuse illness than other persons with mental illness (Galanter, Castaneda, &

Ferman, 1988). Primm and colleagues (2000) found that those persons with dual diagnoses were more likely to have more severe symptoms than persons with only mental illness. Of severely mentally ill patients admitted to the hospital because of an involuntary commitment, those patients who were dually-diagnosed were more likely to have displayed violent behavior than other patients (Swanson, Borum, Swartz, & Hiday, 1999).

Among persons with dual disorder, it seems that persons with schizophrenia have received the most attention in the literature. Studies comparing schizophrenic individuals who abuse substances to schizophrenic individuals who do not abuse substances suggest that the dual disorder group has increased incoherent speech and levels of hostility (Drake, Osher, & Wallach, 1989). They may also be less compliant with medication (Pristach & Smith, 1990) and have higher rates of hospitalization (Drake et al., 1989).

Some authors (Dixon, Haas, Weiden, & Sweeney, 1991) have found a tendency for dually-diagnosed schizophrenic patients to have fewer psychiatric symptoms at hospital discharge than patients experiencing schizophrenia alone. There is a possibility that drug and/or alcohol abuse has complicated a less severe schizophrenic disorder. In other words, persons with less severe schizophrenia who use drugs and alcohol may confound their mental illness to the point where it appears more serious at hospital admission than it actually is. Ironically, Penk and colleagues (2000) suggest that the dually-diagnosed, compared to patients with schizophrenia only, are judged to be more socially competent but less able to control their behavior by mental health practitioners. This has been termed the "paradox of the dually-diagnosed."

PURPOSE

The present study will examine substance use among the chronically mentally ill in a Department of Human Services Case Management System over a three-year period. Based on research discussed above, it is hypothesized that men with mental illness will be more likely to misuse or abuse substances than women with mental illness. In addition, younger men are predicted to have more problems with substance abuse than older men, while this tendency may not be present for female participants. This would be indicative of an interaction between age and gender.

It is expected that the number of medical hospitalizations, psychiatric hospitalizations, and 23-hour observations will be related to increased substance use for both genders. However, increased levels of aggression will be linked to increased substance use for men only. If this is the case, it follows that the number of criminal convictions and involuntary hospitalizations may also be related to increased substance abuse among men.

Past research has indicated that schizophrenic patients with dual-diagnosis are more likely to be non-compliant with medication than patients with schizophrenia alone. In this study, mentally ill men and women with substance abuse problems are expected to have more difficulties managing their medications than mentally ill persons without substance use problems.

It has been suggested that the dually-diagnosed, compared to persons with mental illness alone, are evaluated as more socially competent by mental health practitioners. It is predicted that this research may support this "paradox of the dually-diagnosed." This would mean that mentally ill persons with substance abuse problems will be rated by case managers as having better interpersonal skills than other mentally ill persons.

It is likely that increased substance use is a barrier to improvement for many people with mental illness. Therefore, it is predicted that men and women with increased substance use will improve less than men and women with little or no substance use over a three-year period in the areas of personal hygiene, nutrition, money management, follow through, and coping skills.

Participants in this study were consumers of case management from a Department of Human Services. Past studies tended to use participants from different populations, such as inpatients at psychiatric units or outpatients at mental health centers. The persons in this sample differ from the latter because they must be eligible for Medicaid to be case management consumers. Therefore, it can be assumed that this sample has a lower income than samples drawn from mental health clinics. This discrepancy should be recognized when interpreting the results of this study.

METHOD

Participants

Participants were 462 (220 males, 242 females) adult participants in a Department of Human Services Case Management System. All had a primary diagnosis of chronic mental illness and had undergone a yearly assessment by a case manager for at least three consecutive years (either 1997-1999 or 1998-2000). The minimum age to be eligible for this program as an adult is 18. The mean age of the participants was 41 years (sd = 11.09), while ages ranged from 18 to 78 years at initial assessment. Participants were classified into the following age groups: 18-29 (n = 84), 30-39 (n = 149), 40-49 (n = 112), 50-59 (n = 83), 60-69 (n = 29), and 70-78 (n = 5).

Over 95% of participants classified themselves as Caucasian/white. While 274 participants resided in their own homes, 21 lived with relatives. The remainder resided in care facilities (n = 142) or classified their living situation as "other" (n = 25). Nearly 50% (n = 227) of participants were not employed at the beginning of the study, while 163 participants worked in a sheltered environment. Forty-three participants were employed in a supported setting, and the rest (n = 27) worked competitively. (Competitive employment involved a participant seeking a job independently and working without the involvement of case management). The mean monthly earned income for participants in a sheltered setting was $148.01, while the mean for participants in a supported environment was $312.96. For those participants who were employed in a competitive setting, the mean monthly earned income was $189.01.

Case managers completed outcomes assessments for each consumer annually. Case managers were licensed Department of Human Services social workers who based their

ratings on contacts with the participant and other persons' involved in the participant's daily life, such as family members, employment supervisors, and mental health practitioners.

Measures

Case managers completed a Targeted Case Management Outcomes Assessment for each year. The assessment included demographic information such as date of birth, gender, and ethnic origin. Primary diagnosis (chronically mentally ill, mentally retarded, developmentally delayed, or brain injured) was also identified. Case managers recorded the number of medical hospitalizations, psychiatric hospitalizations, 23-hour observations, and criminal convictions in the time period since the previous assessment. In addition, case managers identified living location, earned income, and work setting.

On the final section of the assessment, case managers rated participants from 1 to 11 on a total of 16 items divided into four groups. Higher scores indicated better functioning. In the area of safety, case managers rated participants on safety needs, abuse/exploitation, involuntary commitment, and acts of aggression. Items pertaining to the participant's health included substance abuse, personal hygiene, nutrition, and medication management. In the area of self-sufficiency, case managers rated participants on basic needs, community mobility, community integration, money management, and job performance. Stability items included follow through, coping skills, and interpersonal skills.

Case managers were instructed that substance abuse included alcohol but did not include nicotine or caffeine. A rating of 10-11 indicated that a participant had no substance abuse issues. A mid-range rating, such as 5-7, indicated that a participant frequently abused substances with no serious consequences, while a low rating, such as 1-3, indicated that a

participant experienced excessive substance abuse during the assessment period, was frequently intoxicated or high, and was dependent on continuing use.

Plan of Analysis

For statistical analyses, participants will be divided into three groups in the area of substance use. Participants rating 10-11 will be classified as "no use," while participants who are rated as 7-9 will be classified as "use." The "abuse" group will include participants who rate less than 7. This will be particularly useful because this variable is not normally distributed. Descriptive statistics will be calculated for all variables at each wave of measurement. Preliminary group comparisons (no use vs. use vs. abuse) will be conducted on dependent variables including living location, employment setting, length of time in case management, job performance (where applicable), and earned income. Test of hypotheses will then be conducted to compare the three substance use groups.

Effects sizes d and f will also be presented (Cohen, 1987). An effect size d can be defined as the standardized difference between two groups. Cohen (1987) suggests that small effect size d equals .2, a medium effect size d equals .5, and a large effect size d equals .8. Effect size f can be used when more than two groups are compared. In this case, a small effect size f equals .10, a medium effect size f = .25, and a large effect size f = .40 (Cohen, 1987).

RESULTS

Descriptive Statistics

Participants rating 10-11 on substance abuse (n = 326) were classified as "no use." Participants rating 7-9 (n = 82) were classified as "use," and participants rating less than 7 (n = 54) were classified as "abuse." Because of the comparatively large number of participants in the "no use" group, 75 participants out of 326 were randomly selected. Analyses were conducted with the full sample and also with this reduced sample.

For the reduced sample, the total number of participants was 211 (108 males, 103 females). Over 95% of participants were white/Caucasian. The mean age was 38.2 years (SD = 10.8, range 18 to 78). Of this sample, 107 participants were not employed at the time the study began. Sixty-six worked in sheltered setting (mean monthly income = $163.89), while 19 were employed in a supported environment ($215.67). Seventeen participants worked competitively, with a mean monthly income of $166.78. More than 60% (N = 130) of the participants lived in their own home, while 59 participants lived in a residential facility of some type. In addition, 10 participants lived with relatives and 11 classified their living situation as "other."

Substance Group Comparisons at Initial Assessment

Full Sample

Chi-square tests were used to test the independence of substance use group and other variables. Gender was independent of substance use group, X^2 (2, N = 426) = 1.55, p = .46. In addition, work setting was independent of substance use group, X^2 (6, N = 426) = 5.55, p = .48. Living situation was also independent of substance use group, X^2 (12, N = 426) = 8.74, p = .73.

The three substance use groups were compared using one-way ANOVAs on the ratings given by case managers on the initial assessment of each individual (see table 1 for means). The groups did not significantly differ at the .05 level in the following areas: safety needs [F (2, 459) = .10, p = .90, f = .01], abuse or exploitation [F (2, 459) = 1.32, p = .27. f = .04], personal hygiene [F (2, 459) = .71, p = .49, f = .03], nutrition [F (2, 459) = 1.74, p = .18, f = .05], medication management [F (2, 459) = 1.38, p = .25, f = .04], basic needs [F (2, 459) = 1.58, p =.21, f = .05], community integration [F (2, 459) = .23, p = .79, f = .02], and interpersonal skills [F (2, 459) = .81, p = .45, f = .03].

A one-way ANOVA comparing the three substance groups in the area of involuntary commitment at initial assessment was statistically significant [F (2, 459) = 12.69, p = .00, f = .14]. (It should be noted that involuntary commitment was rated by case managers as risk of committal. Higher scores indicated less risk of committal.) Post-hoc analyses revealed that the use (M = 6.66, SD = 2.17) and no use (M = 7.82, SD = 2.68) groups significantly differed [t (459) = 3.59, p = .00, d = .36]. There was also a significant difference between the abuse and no use (M = 7.83. SD = 2.68) groups [t (459) = 4.09, p = .00, d = .38]. The Bonferroni's procedure was used to set the level of statistical significance at .0167 (.05/3), as there were three comparisons completed for each significant overall F-test.

A one-way ANOVA comparing the groups on aggression was significant [F (2, 459) = 11.35, p = .00, f = .31]. Post-hoc analysis showed that there were significant differences between the use and no use groups [M = 8.05, SD = 2.25; vs. M = 9.10, SD = 2.30; t (459) = 3.54, p = .00, d = .33], as well as between the no use and abuse (M = 7.78, SD = 3.12) groups [t (459) = 3.74, p = .00, d = .35].

Table 1. Means on case manager ratings.

	Full Sample (N = 462) Mean (SD)	Reduced Sample (N = 211) Mean (SD)
Safety needs	7.38 (2.31)	7.33 (2.50)
Abuse or exploitation	7.57 (2.47)	7.49 (2.54)
Involuntary commitment	7.00 (2.62)	7.43 (2.68)
Acts of aggression	8.25 (2.58)	8.76 (2.45)
Personal hygiene	8.14 (2.13)	8.07 (2.13)
Nutrition	6.78 (2.57)	6.64 (2.70)
Medication management	6.34 (2.32)	6.36 (2.45)
Basic needs	6.80 (2.48)	6.69 (2.51)
Community mobility	7.89 (2.28)	7.54 (2.51)
Community integration	7.13 (2.30)	6.98 (2.29)
Money management	5.36 (2.19)	5.54 (2.35)
Follow through	6.49 (1.76)	6.76 (1.84)
Coping skills	5.73 (1.83)	5.91 (1.88)
Interpersonal skills	6.76 (1.74)	6.96 (2.13)

The three groups also differed on community integration, [F (2, 459) = 3.11, p = .046, f = .07]. However, further analyses demonstrated that none of the post-hoc comparisons between the three groups were significant at the .0167 level when equal variances were assumed.

The three substance abuse groups significantly differed on follow through [F (2, 459) = 9.93, p = .00, f = .12]. The abuse group (M = 5.85, SD = 1.65) tended to score lower on follow through than the use group [M = 6.51, SD = 1.78; t (459) = 2.09, p = .037, d = .20], but this contrast was not significant at the pre-set .0167 level. The no use group did differ significantly from the abuse group [t (459) = 4.24, p = .00, d = .40]. In addition, the use group scored lower than the no use group (M = 6.98, SD = 1.83), although this difference was not significant at .0167 level [t (459) = 2.08, p = .038, d = .19].

A one-way ANOVA showed significant differences between the three groups on coping skills [F (2, 459) = 5.19, p = .006, f = .09]. The use (M = 5.61, SD = 1.73) and abuse (M = 5.31, SD = 1.93) groups differed significantly on coping skills [t (459) = 2.80, p = .005, d = .26]. Post-hoc analyses also revealed that the use and no use (M = 6.08, SD = 1.88) groups differed, although this difference did not reach statistical significance at the pre-set .0167 level [t (459) = 2.05, p = .041, d = .19]. The difference between the abuse and no use groups was statistically significant [t (459) = 2.80, p = .005, d = .26].

Reduced Sample

Gender was shown to be independent of group, X^2 (2, N = 211) = 1.32, p = .52. A test statistic of X^2 (6, N = 209) = 3.14, p = .79, was obtained when testing the null hypothesis of independence between group and work setting. Living situation at the start of the study was also shown to be independent of group, X^2 (12, N = 211) = 12.56, p = .40.

The three substance groups were compared on the ratings given by case managers on the initial assessment of each individual (see table 1 for means). The groups did not statistically differ (at the .05 level) in safety needs [F (2, 208) = .10, p = .90, f = .02], abuse or exploitation [F (2, 208) = 2.88, p = .06, f = .10], acts of aggression [F (2, 208) = 3.00, p =

.052, f = .10], personal hygiene [F (2, 208) = .54, p = .58, f = .04], nutrition [F (2, 208) = 1.42, p = .24, f = .07], medication management [F (2, 208) = 1.53, p = .22, f = .07], basic needs [F (2, 208) = 1.28, p = .28, f = .06], community mobility [F (2, 208) = .43, p = .65, f = .04], community integration [F (2, 208) = 1.50, p = .23, f = .07], money management [F (2, 208) = .17, p = .84, f = .02], interpersonal skills [F (2, 208) = .01, p = .99, f = .00], or job performance [F (2, 99) = .34, p = .67, f = .05]. The three substance use groups differed on involuntary commitment, follow through, and coping skills. Again, the level of significance for post-hoc tests was set at .0167 (.05/3)

Like in analyses involving the full sample, a one-way ANOVA showed significant differences between groups in involuntary commitment [F (2, 208) = 8.26, p < .001, f = .16]. Higher scores indicate less risk of committal. The mean rating for the no use group was 7.93 (SD = 2.86), while the mean rating for the use group was 6.66 (SD = 2.17). The abuse group had the lowest mean (6.24, SD = 2.65). Post-hoc tests revealed that the mean of the abuse group was significantly lower than the mean of the no use group [t (208) = 3.74, p = .00, d = .52], and that the mean of the use group was significantly lower than the mean of the no use group [t (208) = 3.15, p = .002, d = .44].

As in the full sample, a one-way ANOVA comparing the groups on follow through was significant [F (2, 208) = 6.25, p = .002, f = .14]. Post-hoc analyses revealed that the abuse group (M = 5.85, SD = 1.65) significantly differed from the no use group [M = 6.93, SD = 1.89; t (208) = 3.53, p = .001, d = .49]. The use group (M = 6.51, SD = 1.78) tended to score higher than the abuse group, but this difference was not significant at the .0167 level [t (208) = 2.20, p = .029, d = .31] groups.

A one-way ANOVA was performed to compare the three groups in coping skills [F (2, 208) = 3.59, p = .029, f = .11]. Like in the full sample, substance use group was significantly related to coping skills. Post-hoc analyses showed that the only groups that significantly differed were abuse (M = 5.31, SD = 1.93) and no use [M = 6.15, SD = 1.80; t (208) = 2.58, p = .011, d = .36].

Tests of Hypotheses

Time x gender x age on substance use

Men were hypothesized to have more substance use problems than women, and younger men were predicted to have more substance use problems than older men. A 3 (time of measurement) x 2 (male vs. female) x 2 (younger vs. older) repeated measures MANOVA was performed with substance use problems as a dependent variable. Participants who were forty years old or younger were placed in the younger category. Participants who were older than forty fell into the older group. The case managers' ratings on substance use were used for this analysis.

Full Sample

The possibility of interactions was explored first. The second-order interaction (time x gender x age) was not statistically significant [F (2, 910) = .59, p = .55]. The between-subjects first-order interaction (age x gender) approached but did not reach significance [F (1, 455) = 3.65, p = .06]. Within-subjects first-order interactions were not significant [time x age: F (2, 910) = .37, p = .69; time x gender: F (2, 910) = 21, p = .80].

The only predictor variable to have a significant main effect on substance use was age. Participants who were younger had more problems with substance use than participants who were older [F (1, 455) = 34.55, p = .00, d = .55]. Contrary to the hypothesis, men did not

have significantly more problems with substance use than women did, [F (1, 455) = .29, p = .58, d = .03]. Time was also not a significant predictor, as participants did not change across time [F (2, 910) = 1.79, p = .17, d = .09].

Reduced Sample

Again, the three-way interaction effect between age, gender, and time was not significant [F (2, 412) = .55, p = .58]. Two-way interactions were also not statistically significant [time x age: F (2, 412) = .02, p = .98; time x gender: F (2, 412) = .40, p = .67; age x gender: F (1, 206) = 2.97, p = .09]. Like in the full sample analysis, the main effect for age was significant [F (1, 206) = 6.93, p = .009, d = .37]. Younger participants had more problems with substance use than older participants. The main effect for gender [F (1, 206) = .38, p = .54, d = .09] was not significant. However, participants in the reduced sample showed improvement across time [F (2, 412) = 20.06, p = .00, f = .18]. Participants at time 1 had significantly more substance use problems than participants at time 2 [t (210) = 4.74, p = .00, d = .65] and time 3 [t (209) = 5.88, p = .000, d = .81]. Participants also improved from time 2 to time 3 [t (209) = 2.84, p = .005, d = .39].

Time x gender x group on number of medical hospitalizations, psychiatric hospitalizations, and 23-hour observations

The number of medical hospitalizations, psychiatric hospitalizations, and 23-hour observations were expected to be related to increased substance use for men and women. If the outcome variables were significantly correlated, a 3 (time of measurement) x 2 (male x female) x 3 (no use, use, vs. abuse) MANOVA would be conducted with number of medical hospitalizations, psychiatric hospitalizations, and 23-hour observations as outcome variables.

If the outcome variables were not correlated, three separate 3 (time of measurement) x (male vs. female) x 3 (no use, use, vs. abuse) ANOVAs would be performed.

Full sample

Number of medical hospitalizations and number of psychiatric hospitalizations were significantly positively correlated [r (461) = .15, p = .001]. Number of psychiatric hospitalizations were also positively associated with number of 23-hour observations [r (461) = .18, p = .00]. Number of medical hospitalizations and number of 23-hour observations were not significantly correlated [r (461) = .04, p = .37].

A repeated measures MANOVA was conducted with all three outcome variables. The three-way MANOVA interaction between time, gender, and substance use group was not significant [F (12, 900) = .39, p = .97]. The two-way gender x time interaction effect was also not statistically significant [F (6, 450) = .29, p = .94]. Interactions between group and gender [F (6, 906) = .71, p = .64] and group and time [F (12, 900) = .63, p = .82] were not significant.

Because no interactions were significant, MANOVA main effects were explored. Substance use group [F (6, 906) = 1.11, p = .35, d = .07] and time [F (6, 450) = .60, p = .73, d = .07] were not significant predictors of numbers of hospitalizations and 23-hour observations. Men, compared to women, had fewer hospitalizations and 23-hour observations [F (3, 453) = 5.46, p = .001, d = .22]. This main effect was further analyzed by univariate ANOVAs. There was not a significant main effect of gender on number of medical hospitalization [F (1, 459) = 1.14, p = .28, d = .10]. Gender was a significant predictor of number of psychiatric hospitalizations [F (1, 459) = 11.87, p = .001, d = .32] and number of

23-hour observations [F (1, 459) = 4.10, p = .04, d = .19]. Women had a greater number of psychiatric hospitalizations and of 23-hour observations than men.

Reduced Sample

As in the full sample, number of medical hospitalizations, number of psychiatric hospitalizations, and number of 23-hour observations were related. Number of psychiatric hospitalizations was positively associated with both number medical hospitalizations [r (210) = .28, p = .00] and number of 23-hour observations [r (210) = .15, p = .025]. Number of medical hospitalizations were not significantly associated with number of 23-hour observations [r (210) = .06, p = .42].

A 3 (time) x 3 (no use, use, vs. abuse) x 2 (male vs. female) repeated measures MANOVA was conducted with number of medical hospitalizations, psychiatric hospitalizations, and 23-hour observations as outcome variables. Again, the second-order interaction (group x gender x time) was not significant [F (12, 400) = .75, p = .70]. Within-subject first-order interactions were also not significant [time x gender: F (6, 200) = .53, p = .78; time x group: F (12, 400) = 1.06, p = .39]. In addition, there was not a significant effect for the group x gender interaction [F (6, 406) = .88, p = .51].

Because no first-order interactions were significant, main effects were examined. Substance use group was not a significant predictor of number of hospitalizations and 23-hour observations [F (6, 406) = .37, p = .90, f = .02]. Participants also did not change significantly across time [F (6, 200) = .99, p = .43, f = .06]. Like in the full sample, there was a significant main effect for gender [F (3, 203) = 5.44, p = .001, d = .33]. This MANOVA main effect was followed up with univariate ANOVAs. Compared to men, women were prone to more medical hospitalizations [F (1, 205) = 10.32, p = .002, d = .45], psychiatric

hospitalizations [F (1, 205) = 8.14, p = .005, d = .40], and 23-hour observations [F (1, 205) = 6.69, p = .01, d = .36].

Time x Gender x Group on Aggression

It was predicted that aggression would be related to substance use problems for men and women. A 3 (time of measurement) x 2 (male vs. female) x 3 (no use, use, vs. abuse) repeated measures ANOVA was conducted with aggression as the outcome variable.

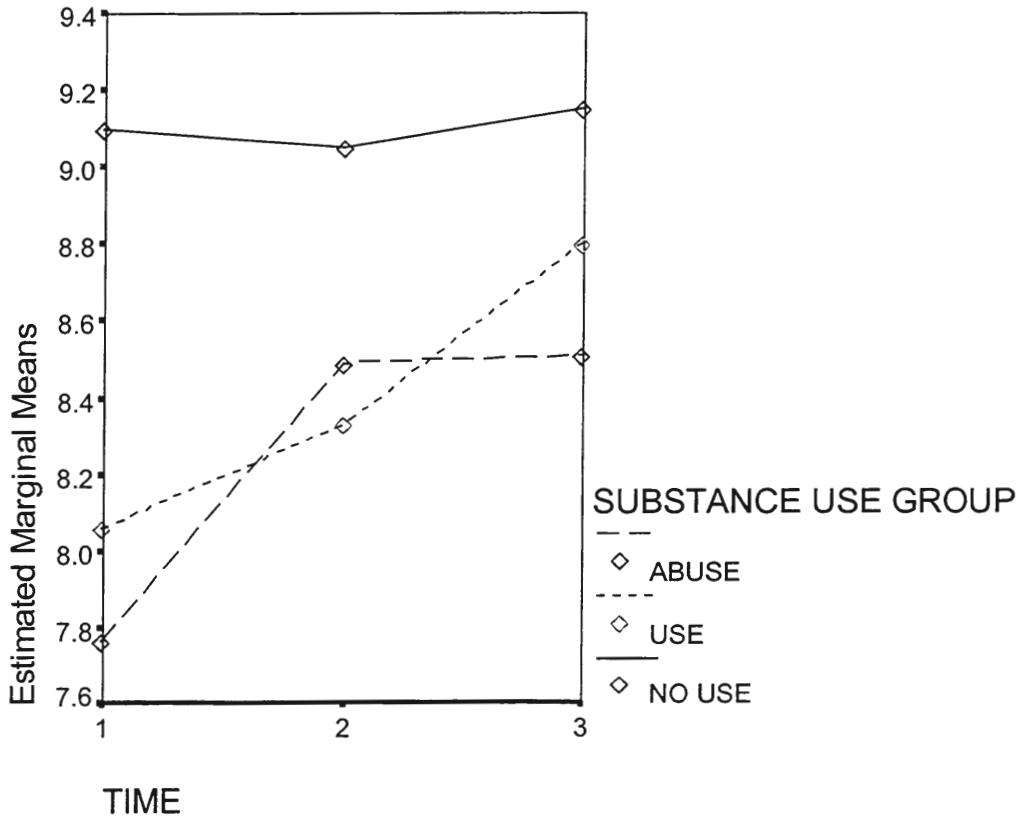
Full Sample

The second-order interaction between time, group, and gender was not found to be significant [F (4, 906) = 1.05, p = .38]. Therefore, first-order interactions were explored. The interaction between time and gender was not significant [F (2, 906) = .70, p = .50]. The group x gender interaction was also not significant [F (2, 453) = .64, p = .53]. However, there was a significant interaction effect of group x time on aggression [F (4, 906) = 4.42, p = .002; see figure 1]. There was not a significant difference between men and women on aggression [F (1, 453) = .11, p = .74, d = .03].

Because the interaction effect of time x group was significant, one-way ANOVAs were conducted at each phase with group as the predictor variable and aggression as the outcome variable. At time 1, there was a significant effect for substance use group [F (2, 459) = 11.35, p = .00, f = .13]. Post-hoc tests revealed that the no use group was rated as significantly less aggressive than the use group [t (459) = 3.54, p = .00, d = .33] and the abuse group [t (459) = 3.74, p = .00, d = .35]. The use and abuse groups did not differ significantly [t (459) = .64, p = .52, d = .06]. At time 2, group was a significant predictor of aggressiveness [F (2, 458) = 4.49, p = .012, f = .08]. In this case, the abuse group was rated as slightly less aggressive than the use group, but this difference was not significant. The use

group was significantly more aggressive than the no use group [t (458) = 2.76, p = .006, d = .26]. The abuse and no use groups did not differ significantly. At time 3, substance use group also had a significant effect on aggression [F (2, 457) = 3.00, p = .05, f = .06]. The abuse group was more aggressive than the no use group [t (457) = 2.22, p = .027, d = .21], although this effect was not significant according to the pre-set level of .0167. While the abuse group was rated as slightly more aggressive than the use group, these groups did not differ significantly [t (457) = .89, p = .38, d = .08]. In addition, there was not a significant difference between the use and no use groups [t (457) = 1.40, p = .16, d = .13].

Figure 1. Group x gender on aggression (full sample).



Reduced Sample

Again, the three-way interaction (time x gender x group) was not significant [F (4, 408) = .81, p = .52]. Therefore, two-way interactions were explored. In the reduced sample, interactions for time x gender [F (2, 408) = .20, p = .82] and group x gender [F (2, 204) = .63, p = .57] were not significant. Unlike in the full sample, the interaction effect for group x time was not significant [F (4, 408) = 1.40, p = .23].

Main effects were also examined. The effect of group on aggression was not significant [F (2, 204) = 2.11, p = .12, f = .08]. Gender was also not a significant predictor of aggression [F (1, 204) = .01, p = .91, d = .01]. Participants did show significant improvement over time [F (2, 408) = 8.20, p = .00, f = .12]. This result was followed with post-hoc comparisons. Participants were significantly more aggressive at time 1 than time 2 [t (210) = 2.76, p = .006, d = .38] and time 3 [t (209) = 3.48, p = .001, d = .48]. Time 2 and time 3 aggression did not differ significantly [t (209) = 1.53, p = .13, d = .21]. However, the effect size is considered small by Cohen (1987).

Time x Gender x Group on Number of Criminal Convictions and Involuntary Committals

It was predicted that number of criminal convictions and ratings of risk of involuntary committal would be related to substance use among participants. To test this hypothesis, a correlation will be run on criminal convictions and involuntary committals. If the outcome variables are significantly correlated, a 3 (time of measurement) x 2 (male x female) x 3 (no use, use, vs. abuse) MANOVA will be conducted with convictions and committals as outcome variables. If the outcome variables are not correlated, two separate 3 (time of measurement) x (male vs. female) x 3 (no use, use, vs. abuse) ANOVAs would be performed.

Full Sample

In the full sample, number of convictions and committal rating were correlated in the expected direction [r (462) = .18, p = .00]. Therefore, a repeated measures MANOVA was conducted. The second-order interaction (time x gender x group) was significant [F (2, 900) = 2.17, p = .03]. Next, separate 3 (group) x 2 (gender) ANOVAs were conducted with number of convictions and committal rating as outcome variables. This procedure was completed at each wave of data collection.

For number of convictions at time 1, the interaction effect for gender and group approached but did not reach statistically significance [F (2, 456) = 2.95, p = .053]. The effect of group [F (2, 456) = 12.95, p = .00, f = .14] was significant. Post-hoc analysis showed that the abuse group had a greater number of convictions at time 1 than the use [t (459) = 3.26, p = .00, d = .30] and no use [t (459) = 5.31, p = .00, d = .49] groups. The use and no use groups did not differ significantly [t (459) = 1.70, p = .09, d = .16]. In addition, men had a greater number of criminal convictions than women at time 1 [F (1, 456) = 12.98, p = .00, d = .34].

For number of convictions at time 2, the interaction between gender and group was not significant [F (2, 456) = 2.37, p = .09]. The effect of gender on number of convictions was significant [F (1, 456) = 5.06, p = .025, d = .21], with men having a higher number of convictions than women. Substance use group was also a significant predictor of number of convictions [F (2, 456) = 6.67, p = .001, f = .10]. The abuse group had a higher number of convictions than both the no use [t (459) = 3.79, p = .00, d = .35] and the use [t (459) = 3.60, p = .00, d = .34] groups. The no use and use groups did not differ [t (459) = .70, p = .48, d = .07].

The interaction effect of gender x group for convictions at time 3 was not significant [F (2, 456) = .06, p = .95]. The effect of gender was also not significant [F (1, 456) = .05, p = .83, d = .00]. However, substance use group was a significant predictor of number of convictions [F (2, 456) = 3.06, p = .049, f = .07]. While the abuse group had a higher number of convictions than both the use [t (459) = 2.29, p = .02, d = .21] and no use [t (459) = 2.28, p = .02, d = .21] groups, these differences were not significant at the .0167 level. The use and no use groups did not differ [t (459) = .54, p = .59, d = .05].

The same procedure with conducted with that involuntary committal rating as the outcome variable. At time 1, there was not a group x gender interaction [F (2, 456) = .36, p = .70]. In addition, gender was not a significant predictor of the committal rating [F (1, 456) = .94, p = .00]. However, there was a significant effect for group [F (2, 456) = 12.50, p = .00, f = .14]. Post-hoc analysis revealed that the no use group was rated less positively on involuntary committals than the use group [t (459) = 3.58, p = .00, d = .34] and the abuse group [t (459) = 4.09, p = .00, d = .38]. The use and abuse groups did not differ [t (459) = .91, p = .36, d = .09].

At time 2, the interaction effect of group and gender on committal rating was not significant [F (2, 455) = .71, p = .49]. Mentally ill women had more difficulties with committals than mentally ill men [F (1, 455) = 4.37, p = .037, d = .41]. There was also a significant effect for substance use group [F (2, 455) = 4.11, p = .017, f = .08]. The no use group had fewer difficulties with committal than the use [t (458) = 2.01, p = .045, d = .19] and the abuse [t (458) = 2.21, p = .028, d = .21] groups, but these differences were not significant at the .0167 level. The use and abuse groups did not significantly differ [t (458) = .44, p = .66, d = .04].

At time 3, there was not a significant interaction effect of gender x group on committal rating [F (2, 454) = .81, p = .44]. There was a significant effect for gender [F (1, 454) = 4.69, p = .031, d = .20], with mentally ill women having more problems with committal than mentally ill men. The effect for substance use group was also significant [F (2, 454) = 4.59, p = .011, f = .08]. Post-hoc analysis revealed that the abuse group tended to have more difficulties with committals than the no use group [t (457) = 2.22, p = .027, d = .21], but this difference was not significant at the .0167 level. There were not significant differences between the use group and the no use group [t (457) = 1.40, p = .16, d = .13] or abuse group [t (457) = .89, p = .38, d = .08].

Reduced Sample

For the reduced sample, number of criminal convictions and involuntary committal ratings were significantly correlated in the expected direction [r (210) = .18, p = .009]. Therefore, a repeated measures MANOVA was conducted with number of convictions and involuntary committal ratings as outcome variables.

The three-way interaction (time x gender x group) was not significant for the reduced sample [F (8, 402) = 1.46, p = .17]. Therefore, two-way interactions were examined. The group x gender interaction was not significant [F (4, 406) = .92, p = .45]. In the reduced sample, the interaction of group x time approached, but did not reach statistical significance [F (8, 402) = 1.79, p = .08]. There was a significant interaction effect for gender x time [F (4, 201) = 3.61, p = .007]. There was a significant MANOVA main effect for substance use group [F (4, 406) = 5.02, p = .001, f = .22].

Substance use group was a significant predictor of criminal convictions [F (2, 208) = 5.91, p = .003, d = .14]. Pairwise comparisons for number of criminal convictions revealed

that the abuse group had a greater number of criminal convictions that the no use [t (127) = 2.61, p = .01, d = .46] and use groups [t (124) = 3.16, p = .002, d = .57]. The use and no use groups did not differ [t (155) = .41, p = .58, d = .07]. Substance use group was also a significant predictor for committal rating [F (2, 207) = 5.57, p = .004, d = .13]. For committals, the no use group was at significantly less risk than the use [t (155) = 2.51, p = .013, d = .40] and abuse [t (127) = 3.03, p = .003, d = .54] groups. The abuse and use groups did not differ [t (124) = .80, p = .43, d = .07].

Because the MANOVA interaction effect of gender x time was significant, separate one-way (gender) ANOVAs on number of convictions and committal ratings were conducted at each wave. At time 1, gender was not a significant predictor of number of convictions [F (2, 209) = 3.80, p = .053, d = .27], but mentally ill women tended to have fewer convictions than mentally ill men. At time 2, the effect of gender on number of convictions [F (1, 209) = 2.47, p = .12, d = .22] was not statistically significant. At time 3, the effect of gender [F (1, 209) = .02, p = .96, d = .02] was not significant.

At time 1, the effect of gender on committal rating was significant [F (1, 209) = 5.09, p = .025, d = .31], with mentally ill women having more difficulties with involuntary committals than mentally ill men. At time 2, women were at more risk for committal than men [F (1, 209) = 6.61, p = .01, d = .35]. At time 3, women were at more risk for committal than men [F (1, 209) = 8.62, p = .004, d = .40].

Time x Gender x Group on Medication Management

It was predicted that persons with mental illness and substance use problems would have more problems with medication management than persons with mental illness alone. A 3 (time of measurement) x 2 (males vs. female) x 2 (abusers vs. non-abusers) repeated

measures ANOVA was conduced to test this hypothesis. For this analysis, the use and no use group were combined and compared to the abuse group. Only the reduced sample was used for this hypothesis test, as the abuse group only constitutes 11% of the full sample.

Reduced Sample

The second-order interaction (time x gender x abuse group) was not significant [F (2, 412) = 1.47, p = .23]. No first-order interactions were significant [gender x time: F (2, 412) = .64, p = .53; abuse group x time: F (2, 412) = 1.80, p = .17; abuse group x gender: F (1, 206) = .004, p = .95].

Therefore, main effects were explored. Gender [F (1, 206) = 1.04, p = .31, d = .14] and use group [F (1, 206) = 1.33, p = .25, d = .16] were not significant in predicting medication management, although women and non-abusers tended to score higher on medication management than men and abusers. In addition, there was not a significant main effect for time [F (2, 412) = 1.30, p = .41, f = .05].

Time x Gender x Group on Interpersonal Skills

It was predicted that mentally ill persons who abuse substances would be rated by case managers as having better interpersonal skills than mentally ill persons who do not abuse substances. To test this prediction, a 3 (time of measurement) x 2 (male vs. female) x 2 (abusers vs. non-abusers) repeated measures ANOVA will be conducted. Again, only the reduced sample will be used for this analysis because the full sample contains such a small proportion of abusers.

Reduced Sample

First, the three-way interaction (time x gender x group) was examined. This effect was found to be not significant [F (2, 412) = .10, p = .91]. Next, the two-way interactions

were explored. Neither within-subjects interaction was significant [time x group : $\underline{F}$ (2, 412) = 1.27, $\underline{p}$ = .28; time x gender: $\underline{F}$ (2, 412) = .33, $\underline{p}$ = .72]. The between-subjects interaction of group x time was also not significant [$\underline{F}$ (1, 206) = .36, $\underline{p}$ = .57].

Because the interactions were not meaningful, main effect were investigated. Women had better interpersonal skills than men, but this difference was not significant [$\underline{F}$ (1, 206) = 1.02, $\underline{p}$ = .31, $\underline{d}$ = .14]. Abusers were rated by case managers as having slightly better interpersonal skills than non-abusers. However, this difference was not statistically significant and its effect size was weak [$\underline{F}$ (1, 206) = .38, $\underline{p}$ = .54, $\underline{d}$ = .09].

Barrier to Improvement

It is predicted that men and women with increased substance use will improve less than men and women with little or no substance use over the three-year period in the areas of personal hygiene, nutrition, money management, follow through, and coping skills. Outcome variables will be correlated. Outcome variables that are significantly correlated will be tested using a 3 (time of measurement) x 2 (male vs. female) x 3 (no use, use, vs. abuse) repeated measures MANOVA. Outcome variables that are not significantly correlated will be tested using a 3 (time of measurement) x 2 (male vs. female) x 3 (no use, use, vs. abuse) repeated measures ANOVA.

Full Sample

All outcome variables were significantly and positively correlated [$\underline{r}$ (461) > .18, $\underline{p}$ < .01]. Therefore, a repeated measures MANOVA was conducted with personal hygiene, nutrition, money management, follow through, and coping skills as outcome variables.

The three-way interactions between time, group, and gender was not significant [$\underline{F}$ (20, 888) = 1.30, $\underline{p}$ = .17]. Neither within-subjects interaction was significant [gender x time:

F (10, 444) = 1.09, p = .37; group x time: F (20, 888) = .95, p = .53]. There was not a significant gender x group interaction [F (10, 898) = 1.24, p = .26].

Main effects were examined next. Gender was a significant predictor [F (5, 499) = 4.42, p = .001, d = .19]. Univariate ANOVAs revealed that gender was a significant predictor of only personal hygiene [F (1, 453) = 8.85, p = .003, d = .28] and money management [F (1, 453) = 4.50, p = .035, d = .20]. Mentally ill women had better personal hygiene and money management skills than mentally ill men.

Group was also a significant predictor [F (10, 898) = 3.09, p = .001, f = .05]. Univariate ANOVAs revealed significant results for nutrition [F (2, 453) = 4.23, p = .033, f = .08] and follow through [F (2, 453) = 6.06, p = .003, f = .09]. Univariate analyses suggested that increased substance use was linked to poorer nutrition. The abuse group had significantly less adequate nutrition than the no use group [t (378) = 1.96, p = .05, d = .20] but did not differ from the use group [t (134) = .07, p = .94, d = .01]. The no use group had better nutrition than the use group [t (406) = 2.08, p = .03, d = .19]. It is interesting that the use group did not differ from the abuse group. Univariate analysis revealed that decreased substance use was related to increased follow through. The abuse group scored lower on follow through than the no use group [t (378) = 3.35, p = .00], but did not significantly differ from the use group [t (134) = 1.45, p = .15]. The use group scored lower than the no use group, but this difference was not statistically significant at the .0167 level [t (406) = 1.94, p = .053].

The main effect for time was significant [F (10, 444) = 16.90, p = .00, f = .16]. Univariate ANOVAs were significant for follow through [F (2, 906) = 5.04, p = .007, f = .07] and coping skills [F (2, 906) = 124.26, p = .00, f = .30]. Mentally ill persons improved

marginally across time on both of these outcome variables. For follow through, paired t-tests revealed that participants improved slightly from time 1 to time 3 [t (459) = 1.69, p = .09, d = .16], but this difference was not significant. Participants also tended to improve slightly from time 1 to time 2 [t (460) = .90, p = .37, d = .08], but again this was not a significant difference. There was not significant improvement from time 2 to time 3 [t (458) = 1.26, p = .21, d = .12]. For coping skills, the only significant improvement at the .0167 level across time was between time 1 and time 3 [t (459) = 3.22, p = .001, d = .30]. Improvement from time 1 to time 2 [t (460) = 1.98, p = .048, d = .18] and time 2 to time 3 [t (458) = 2.04, p = .042, d = .19] was not statistically significant.

Reduced Sample

For the reduced sample, the three-way MANOVA interaction (time x gender x group) was not significant [F (20, 390) = .96, p = .51]. All three two-way MANOVA interactions were also not significant [group x time: F (2, 390) = .93, p = .55; gender x time: F (10, 195) = .93, p = .51; gender x group: F (10, 400) = 1.51, p = .13].

Like in the full sample, there was a significant MANOVA main effect for gender [F (5, 200) = 3.23, p = .008, d = .25]. Univariate ANOVAs showed that gender had a significant effect on personal hygiene [F (1, 204) = 9.16, p = .003, d = .42] and nutrition [F (1, 204) = 4.06, p = .045, d = .28]. Mentally ill women were rated more positively than mentally ill men on personal hygiene and nutrition.

In the reduced sample, group was not a significant MANOVA predictor [F (10, 400) = 1.65, p = .09, f = .05]. Although there was a significant main effect for group in the full sample, it is important to recognize that the effect sizes in the reduced and full samples are identical. In the full sample, the results were significant because of an increased sample size.

There was significant MANOVA main effect for time in the reduced sample [F (10, 808) = 2.16, p = .02, f = .06]. Again, chronically mentally ill participants showed improvement on follow through [F (2, 408) = 3.83, p = .02, f = .08] and coping skills [F (2, 408) = 6.70, p = .001, f = .10]. For follow through, post-hoc comparisons revealed that the improvement from time 1 to time 3 approached statistical significance [t (209) = 1.94, p = .053, d = .27]. Improvement from time 1 to time 2 [t (210) = 1.30, p = .19, d = .18] and from time 2 to time 2 [t (209) = 1.34, p = .18, d = .19] was not significant. For coping skills, post-hoc analysis revealed that participants improved significantly from time 1 to time 3 [t (209) = 2.85, p = .005, d = .39]. Improvements from time 1 to time 2 [t (210) = 2.18, p = .03, d = .30] and from time 2 to time 3 [t (209) = 1.74, p = .08, d = .24] were not statistically significant at the pre-set .0167 level.

DISCUSSION

Time x gender x age on substance use

It was hypothesized that men would have more substance use problems than women and that younger men would have more substance use problems than older men. In this study, this was not the case, as men and women did not differ in the area of substance use as rated by case managers, and the interaction between gender and age was not significant. Contrary to this study, previous research has indicated that substance use disorder comorbidity is more likely in those mentally ill individuals who are male (Cuffel, 1996; Mueser et al., 1995).

The relationship between age and substance use problems was present for both men and women. In the full and reduced samples, younger participants were more likely to experience difficulties with substances than older participants. This may reflect alcohol and drug-related behaviors within the general population. Perhaps younger persons are more likely to participate in "risky" behaviors than older persons.

In the reduced sample only, participants showed improvement in the area of substance use across time. Though participants did not improve significantly in the full sample, this finding is encouraging. Of course, it is impossible to tease out the amount of change due to case management and the amount of change due to other factors, such as aging and maturation. However, case managers should be pleased that there is some evidence that participants are able to alter their habits in regards to drugs and alcohol, no matter what the causes. This finding needs to be interpreted with caution because participants whose alcohol and drug use increases to dangerous levels may have not been present for three consecutive assessments due to voluntary withdrawal, incarceration, hospitalizations, and other reasons.

Time x gender x group on number of medical hospitalizations, psychiatric hospitalizations, and 23-hour observations

Contrary to the hypothesis, substance use group was not related to number of medical hospitalizations, psychiatric hospitalizations, and 23-hour observations. This finding seems contradictory to common sense, as one would expect that excessive use of substances would increase a person's likelihood of being physically and mentally ill. However, increased substance use may be related to increased physical and mental illness but not to hospitalizations and observations because this particular population (chronically mentally ill substance abusers) are probably unlikely to seek medical care even when it is necessary.

As discussed, the medical model views both mental illness and substance use disorder as diseases which need biological treatment. According to this perspective, it would seem that the abuse group would need to seek medical treatment more often than the other groups. However, this was not the case. Unless this population is receiving outpatient medical treatments, the medical model might suggest that this finding points to a failure of the system to treat those mentally ill persons who are most in need.

In the full and reduced samples, mentally ill women were likely to have more psychiatric hospitalizations and 23-hour observations than mentally ill men. In addition, the results of the reduced sample suggest that women were likely to have more medical hospitalizations than men. In general, it seems that chronically mentally ill women are more likely to visit a hospital than chronically mentally ill men, regardless of substance use group. This may fit with the societal stereotype that encourages men to be strong and not ask for help, while women are allowed to be more vulnerable. It remains to be seen as to whether the women in this study actually had more health problems than the men in this study.

Time x gender x group on aggression

It was hypothesized that increased substance use would be linked to more aggression among chronically mentally ill participants. This hypothesis was supported in the analysis including the full sample, although the post-hoc tests revealed that alcohol and drug users seemed as aggressive as abusers. Of course, it is impossible to determine from this data if substance use is causing aggression from this data. The medical model would suggest that this link might be due to a common brain abnormality or genetic defect, and the psychosocial model might posit that it is because a person's social environment contributes to all three difficulties: mental illness, substance abuse, and aggressive behavior.

It appears that mentally ill participants are becoming less aggressive across time. The greatest strides were exhibited by participants who abuse substances. The least amount of improvement was seen in participants who did not use drugs or alcohol. This is probably because these persons have little room to improve in the area of aggression. There is, in effect, a ceiling effect on the 1-11 scale completed by case managers.

Time x gender x group on number of criminal convictions and ratings of involuntary committal risk

The main effects of gender on criminal convictions and involuntary committal risk in the full and reduced samples imply that the behaviors of mentally ill women with substance use problems are usually not placing them in the criminal justice system but in the psychiatric ward. Among chronically mentally ill women with substance use problems, it seems that the medical model is more representative than the moral model. This may not be true for substance-abusing chronically mentally ill men. It seems that this group tends to land in the criminal justice system rather than the hospital. Of course, it is impossible to tease out

any gender biases as to whether a mentally ill person on drugs or alcohol is treated as a criminal or a patient.

Time x gender x group on medication management

It was hypothesized that substance abusing chronically mentally ill persons would have more problems with medication management than non-substance abusing chronically mentally ill persons. These results suggest that there is only a small, insignificant difference between abusers and non-abusers on medication management. Although one might expect that men would be more likely to have problems with medication management than women, this difference was not statistically significant. Both of these findings indicate that it may not be easy for case managers to predict which persons will be compliant with prescribed medications.

The medical model posits that persons who are mentally ill and persons who abuse substances need biological treatments, such as prescription medications, to recover or improve their situations. This research indicates that substance abuse may not actually be a hindrance to a person's ability to improve their health by these means.

Time x gender x group on interpersonal skills

This study provides no evidence to conclude that the "paradox of the dually-diagnosis" is true. Perhaps a study with more drug and alcohol abusing mentally ill participants would be more conclusive. In addition, it should be considered that the outcome variable is the case manager's perception of the participant's interpersonal skills. Therefore, any analysis of interpersonal skills is vulnerable to how the person presents himself or herself to the case manager and any personal biases the case manager may have.

Psychosocial theorists would suggest that one's interpersonal skills are key in gaining the social support to improve one's situation. According to this perspective, mentally ill substance abusers and non-abusers would not differ in their ability to seek out the relationships and social connections that are important to improved mental health.

Barrier to improvement

It was hypothesized that mentally ill participants with increased substance use will improve less than other mentally ill participants over a three-year period in the areas of personal hygiene, nutrition, money management, follow through, and coping skills. This finding would been indicated by an interaction between group and time, and this result was not present. Perhaps this is due to a ceiling effect on the outcome variables.

However, there was a significant effect of substance use for nutrition and follow through in the full and reduced samples. It could be hypothesized that mentally ill participants may be likely to exchange a healthy diet for drugs and alcohol.

CONCLUSIONS

According to this data, chronically mentally ill persons who are most at risk for substance abuse are younger. This difference could be attributed to a generational effect. Perhaps older persons in this study have used substances less throughout their lives than younger persons in this study because they grew up in different point in history. However, it seems more likely that substance abuse and use decline as one reaches middle and old adulthood. Surprisingly, mentally ill men do not seem more prone to substance abuse than mentally ill women.

Findings concerning improvement over time should be interpreted with caution. First, there might be a problem involving the possibility of a ceiling effect. Mentally ill persons who do not use substances are scoring at the upper end of the range and therefore cannot improve. This is may have resulted in meaningless interaction effects involving time and group. Also, mortality may have played some role in exaggerating the participants' improvement across time. Participants must have been assessed for three consecutive years to be eligible for this study. If a participant was doing poorly and disappeared from case management for any reason, they were no longer part of this research. For instance, mentally ill persons who were admitted to intensive care facilities were dropped from case management. Therefore, persons who declined rather than improved may not have been present for study.

The results regarding gender, substance abuse, and criminal convictions warrant further discussion. Mentally ill men who had problems with substance abuse were more likely to be committers of a crime. Substance-abusing mentally ill women were less likely to be criminally convicted. However, substance-abusing women were involuntarily committed

to psychiatric hospitals more than other women. It seems that the moral model is evident for male mentally ill substance-abusers, as they are treated as criminals and possibly sent to jail. On the other hand, female mentally ill substance-abusers are treated as patients, which is indicative of the medical view. From this data, it is impossible to determine if men are being sent to the courts for the same behaviors that send women to psychiatric wards. Substance abuse for mentally ill women may cause personal distress, whereas substance abuse for mentally ill men may be linked to more dangerous, criminal activity. However, there may be a gender bias present. Men, who are generally larger and stronger than women, may be deemed as more of a threat to others than women and consequently arrested. Women may not be viewed as such a danger and might be hospitalized instead.

Is it possible for mentally ill men and women to use substances in moderation without negative consequences? This study suggests that the answer may be no. When it comes to aggression, nutrition, and follow through, participants who use drugs and alcohol do not differ meaningfully from participants who abuse drugs and alcohol. It seems that chronically mentally ill persons are unable to safely use drugs and alcohol. Perhaps case managers should be aware that moderate use of substances in mentally ill persons is unlikely to come without a price. Alcoholics Anonymous posits that alcoholics are unable to gain control over alcohol and must stop drinking entirely to have normal lives (Comer, 2001). Maybe clinicians should advise that chronically mentally ill men and women take the same approach to substances.

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